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Influence of social media and peer interactions on smoking among selected public and private university students in urban Dhaka, Bangladesh

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Title: Influence of social media and peer interactions on smoking among selected public and private university students in urban Dhaka, Bangladesh

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Article Summary

Abstract

Introduction: Smoking, a global public health concern, is a major lifestyle risk factor for multiple adverse health conditions. It is increasing among university students worldwide, alongside the different social media sites that are influencing their lifestyles.

Objective: To determine the influence of social media and peer pressure on smoking among university students in Bangladesh, which is a lower-middle income country with limited resources.

Methods: A cross-sectional study using mixed methods was conducted with 600 students from two public and two private universities in Dhaka, Bangladesh. The quantitative analysis included Pearson's chi-squared tests, logistic regressions, and a Fisher's exact test using SPSS version 20.0. Twelve brief interviews were conducted and analysed using thematic analysis for the qualitative portion of this study.

Results: There was a strong association ($p<0.01$) between smoking behaviour and average number of hours per day and time of day spent with friends. Smokers also liked, shared, and followed significantly more tobacco-related content on social media than non-smokers ($p<0.001$). The odds of smoking were also higher based on social media and peer interaction variables. Qualitative analysis resulted in emergent themes of smokers imitating tobacco-related photos or videos seen on social media and peers as an influence for smoking initiation.

Conclusion: This study suggests a high prevalence of smoking tobacco among university students in Dhaka, Bangladesh and provides evidence of the influence social media and peer interactions may have on smoking behaviour.

Strengths and Limitation

- The social media along with peer influence on smoking among university students have not been studied previously. In Bangladesh, there is no such data on the impact of social media on smoking.

- This study generated the evidence on social media influence and peer pressure on smoking among university students which is very alarming and will add value for further smoking cessation interventions in Bangladesh & other similar setting
- This study covered both public and private university students from 1st year to master's level students
- Due to time and resource constraints, it was not possible to conduct in-depth interviews and focus group discussions, which would have allowed a detailed exploration of the different perceptions and thoughts related to factors underlying initiation or continuation of smoking
- The study could not capture data from students studying universities in rural areas/ outside Dhaka city due to limited funding.

Introduction

Smoking, a global public health concern, is one of the major lifestyle risk factors for multiple adverse health conditions. According to World Health Organization, it is estimated that smoking- and tobacco-induced diseases lead to approximately 6 million deaths annually (1). By 2030, 8.3 million deaths worldwide will be attributed to these diseases, representing 10% of deaths globally (2). The number of tobacco smokers in the world in 2000 was 1.1 billion and is estimated to remain around this rate until at least 2025. The global WHO report depicts that 24.9% of people aged 15 years and older are using tobacco in some form or another. The prevalence of tobacco usage is higher among men (40.3%) than women. Among young people aged 15-24 globally, the average rate of tobacco use is 17% in the year 2015. Globally, 19.8% of people smoke tobacco, with a significant number of these smokers in South East Asia. According to the Global Youth Tobacco Survey, at least 43.8 million adolescents aged 13-15 use some form of tobacco, and the South East Asian region has the largest number of child tobacco users (14.8 million, or 34% of the global total). Adolescents from high-income countries have a lower average prevalence rate than those from lower-middle income countries (3). The incidence rate of smoking remains high among adolescents, with a decrease in the age of onset over time (4). Studies suggest that a substantial number of smokers among

young populations pick up the habit while in university (5–7). Nazary et al. reports that 43.5% of university students start smoking during their time at university (8).

In contrast to many developed countries, smoking in Bangladesh, a lower-middle income country, is currently not banned in most public places. Hence, smokers are not under any social pressure to quit smoking. Bangladesh is one of the largest tobacco consuming countries in the world (1). The WHO estimates that almost a quarter of Bangladesh's population were smokers in 2010 (approximately 24,606,800 persons), with 46% of men smoking and about 1% of women smoking (1). The country's prevalence rate declined in 2017 to 18%, however, there was a rise in the percentage of smokers among the male population (9). Moreover, 17.3% of Bangladeshi smokers are aged between 15-24 years (1). One study suggests a rising prevalence in smoking among university students in the Sylhet Division of Bangladesh, with almost half of their male student sample being smokers (10).

Media has a strong effect on spreading knowledge about tobacco usage, as one study cites over half of adults notice tobacco advertised in different medias, including social media (9). Social media are web-based platforms that are a very popular way to transmit or share information with a broad audience in the modern day, as anyone can create content and disseminate it globally. According to the Bangladesh Telecommunication Regulatory Commission (BTRC), the total number of Internet subscribers has reached 93.3 million in 2019, with Facebook being the most used social media (11). Social media now plays a vital role in marketing different tobacco products and brands. Tobacco companies utilize Facebook, Wikipedia, and YouTube for promotional activities, with sales promotion most prevalent on YouTube (12). Major U.S. tobacco companies report increased expenditures on advertising through internet marketing, including social media, which have exponentially risen from $125,000 in 1998 to $23.3 million in 2014 (13). Tobacco companies looking for savvier ways to market their products target younger audiences by networking through social media, which also allows them to capture advantageous data on this population that help increase tobacco profits. A majority of university students use social media, rife with possibilities of watching the tobacco companies' posts in their feed (14). Unsurprisingly, online tobacco advertising viewed by adolescents increased from 25.9% in 2000 to 44.7% in 2011 (15). As both protobacco marketing

and anti-tobacco campaigns can be spread through the Internet, understanding the effects of social media on smoking behaviour among youth is imperative to public health. However, in Bangladesh, there is no such data on the impact of social media on smoking.

As internet use becomes more widespread among Bangladeshi youth, many of whom are studying in universities, there may be a possibility of social media influencing this population to engage in smoking. On the other hand, adolescents have reported influence from peers on their initiation and continuation of cigarette smoking (16, 17). Many university students may also be influenced by their peers at and during the 'adda', which in Bangladeshi culture refers to both the locations a group of likeminded individuals congregate as well as the intellectual exchanges that take place when an adda forms. As addas are social affairs, with smokers often mixing with non-smokers, those who do not smoke are not only exposed to passive smoking, but sometimes even influenced to "try a puff." Understanding the extent to which both social media and in-person peer pressure affect smoking behaviour in youth behoves public health campaigns aiming to reduce global smoking rates. The purpose of this study is to assess the influence of social media on smoking behaviour and evaluate the role of peer groups on smoking behaviour among university students in urban Dhaka.

Methodology

Study design

This was a mixed methods study utilizing a cross-sectional design and semi-structured interviews in between March to November 2017 among university students of two public and two private universities in Dhaka city. The two public universities were University of Dhaka and Jahangir Nagar University, and the two Private universities were North South University and American International University- Bangladesh. The estimated sample size of 600 was calculated based on the 23% prevalence estimate of tobacco smoking among the general population (18–20). A pre-structured, pre-tested questionnaire was used to collect data for the quantitative assessment. University students aged 18 and older who use at least one form of social media via mobile, tablet, or computer were included. Exclusion criteria were those who did not use at least

one form of social media and students who were enrolled in a PhD or other doctoral-level degrees. Both smokers and non-smokers were included for the quantitative component of this study, while the qualitative component included only smokers.

Sampling

A systematic random sampling technique was used to select the students from different sections of the science, arts, and commerce subjects. Attendance directories of the students in different classes were collected from class teachers as a sampling frame. The sample size was calculated with Fisher's statistical formula for determining a sample size for a cross-sectional study.

$$n=\frac{Z2p(1-p)}{d^2}$$

Where:

n= the required sample size

Z= critical value associated with the level of confidence. A 95% confidence level was used. This corresponds to a Z value of 1.96

d=Precision/margin of error, set at 0.05 (5% margin of error)

p= Prevalence of smoking, 0.23 (23%) for the population (18–20)

Based on this calculation, the sample size was 276, which was increased to 300 considering about a 10% non-response rate. This sample was determined based on private universities. Based on this sample size, 300 students were also added from public universities. While this approach was not ideal, as students from private university tend to be more socioeconomically homogenous than those attending public university, the limited time and resources of this study's authors necessitated this smaller estimation. However, as the topic of this study, tobacco smoking, is so widespread among this age group, any adverse impact of this underestimation is likely to be negligible. Therefore, the total sample was 300 X 2 = 600, which was equally distributed (300+300) between public and private universities as follows:

- University of Dhaka – 150 participants
- Jahangirnagar University – 150 participants
- North South University – 150 participants
- American International University of Bangladesh – 150 participants

For the qualitative assessment, 12 students (3 from each university) who were smokers that used social media were selected. The samples for this assessment were chosen purposively considering the time, availability, and feasibility of research staff. As the aim of the qualitative component was to find insights on initiation of and reasons behind smoking, only smokers were included. These additional participants were approached separately by the research team.

Data collection method and tools

Face-to-face interviews using a semi structured instrument were conducted by eight research assistants (RAs) to collect data for the quantitative methods. The recruited RAs were trained on the objectives of this research and how to approach respondents in order to ensure quality data collection. Interviews were conducted in various study areas where the respondents were comfortable, such as classrooms, tea-stalls, libraries, canteens, hostels, etc. The RAs were equally distributed among the universities (two RAs per university) and started collecting data simultaneously from the four universities. Pre-testing (on 5% of the sample) for the instrument was done to ensure validity, reliability, accuracy, and cultural and linguistic appropriateness of the questionnaire. Throughout data collection, completed questionnaires were cross-checked by one of the investigators as a quality control measure.

For the qualitative methods, 12 brief qualitative interviews using a brief topic guide were conducted with three students from each of the four universities. The Principal Investigator (PI) of this study interviewed all participants. In addition to having a written record of each interview, all interviews were recorded with respondents' consent. Recordings were then transcribed by two study team members and checked by the PI and Co-PI on a regular basis. After the qualitative data was analysed thematically by research staff, the

resulting themes were discussed with the PI to ensure that interpretations aligned with the interviews. Final themes were a result of this iterative process. Atlas.ti software was used for managing qualitative data.

Data Analysis

The collected data was cleaned, separated, and entered by RAs and quality checked by the PI regularly. SPSS 20.0 software was used for all statistical analyses. Pearson's chi squared test, Fisher's exact test, and multivariate logistical regressions were used to evaluate the associations between the variables. Statistical significance was accepted at the 0.05 level.

Ethical Consideration

Ethical clearance was obtained from the Ethical Review Board (ERB) of North South University, Dhaka Bangladesh (178074). Formal administrative permission from each participating institute was also taken. Informed written consent was collected from each participant in the study. Ethical standards were maintained to the highest possible extent whilst conducting the study. All interviews were conducted in private spaces within study areas respondents felt comfortable in, and with all necessary permissions.

Results

Quantitative findings

Participants

Respondents included 600 students from four universities in the Dhaka division. Of this number, 75.2% were male and 24.8% were female. Their ages were between 18 to 32 years, and the mean age of respondents was 21.8±2.2 years (Table 1).

Prevalence of smoking

The overall prevalence estimate of tobacco smoking was 33.5% among the study participants. Chi-squared tests of association between smoking status and sociodemographic characteristics of the participants show that 43.7% of male students were smokers, while only 2.7% of female students were smokers (Table 1). This difference between the ratio of smokers to non-smokers among male and female students was

statistically significant (p<0.001). Father's education was also significantly associated (p<0.01) with student smoking behaviour, with more smokers among those whose fathers have lower education than those whose fathers have higher education.

Association of social media use with smoking

Facebook was the preferred social media among the participants, with 73% using Facebook the most, 21.8% using YouTube the most, and 5.2% choosing other forms of social media. Of the Facebook users, 30.1% were smokers, whereas significantly more (44.3%; p<0.05) of the YouTube group were smokers (Table 2). The number of smokers was significantly higher among those who have used social media for more than five years compared to those who have used social media for five years or less (p<0.01) and among those who typically used social media at night rather than during the day (p<0.01). There was also a significant association between tobacco advertising, promotion and sponsorship (TAPS) activities on social media and smoking status of the participants. Chi-squared analyses showed that there were significantly more smokers out of those who shared TAPS related pictures or images on social media (73.6%) than there were out of those who did not share TAPS related pictures or images (13.3%; p<0.001). Similarly, the prevalence of smoking was higher among those who shared TAPS related videos on social media (74.6%) than out of those who did not share TAPS related videos (12.2%; p<0.001). Liking or following TAPS related content was also significantly associated with smoking status (Table 2).

Association of peer interaction with smoking

The number of hours and the typical time of day (day vs. night) spent with peers were significantly associated with smoking status of participants (**Table 3**). About half of the smokers spent four hours or more a day with peers, while only 35.3% of the non-smokers spent this same amount of time with peers (p<0.01). More smokers (58%) typically spent time at night with peers compared to non-smokers (33%; p<0.001). Additionally, 72% of participants answered “yes” when asked if peer pressure had a significant influence on smoking behaviour.

Predictors of smoking

Table 4 summarizes the results of multivariate logistic regression analyses examining the associations between smokers and sociodemographic characteristics, social media use, and peer interaction among participants. After adjusting for sociodemographic variables, including age, sex, living place, and income status, male students had the greatest odds of smoking (odds ratios [OR] 29.16, confidence interval [CI] 10.55–80.69; Model 2). These odds were higher after adjusting for social media use (OR 51.83, CI 15.26–176.06; Model 3), but lower after adjusting for peer interaction (OR 23.50, CI 8.47–65.21; Model 4). Students who prefer YouTube were associated with higher odds of smoking after adjusting for sociodemographic variables (OR 1.77, CI 1.15–2.75; Model 2), as well as after adjusting for peer interaction (OR 1.86, CI 1.22–2.83; Model 4). Students who have used social media for more than 5 years have higher odds of smoking after adjusting for social media use (OR 2.03, CI 1.12–3.69; Model 3), as well as after adjusting for peer interaction (OR 1.65, CI 1.04-2.62; Model 4). Students who use social media more at night have 2.41 (CI 1.24–4.69; Model 2) times the odds of being smokers than non-smokers after adjusting for sociodemographic variables. However, this odds ratio decreased slightly after adjusting for variables related to peer interaction (OR 1.95, CI 1.02–3.73; Model 4). After adjusting for sociodemographic variables, the odds of being a smoker was 21.99 times (CI 13.35-36.21; Model 2) greater in those who shared TAPS related images. After adjusting for social media use, this odds ratio decreased to 4.95 (CI 2.29-10.71; Model 3), but was 16.90 (CI 10.87-26.29; Model 4) after adjusting for peer interaction. Similarly, those who shared TAPS related videos on social media had 23.94 times the odds (CI 14.52-39.48; Model 2) of being a smoker after adjusting for sociodemographic variables, an odds ratio of 9.47 (CI 4.21-21.31; Model 3) after adjusting for social media use, and an odds ratio of 20.50 (CI 13.02-32.26; Model 4) after adjusting for peer interactions. Students who spent more than four hours per day with peers had 1.75 times higher odds of being a smoker after adjusting for sociodemographic variables (CI 1.09-2.82; Model 2) as well as after adjusting for peer interaction variables (CI 1.12-2.75; Model 4). Spending time with peers at night also had significantly higher odds ratios after adjusting for sociodemographic variables (OR 2.11, CI 1.45-3.08; Model 2), social media use (OR 2.40, CI 1.50-3.84; Model 3), and peer interaction (OR 2.80, CI 1.95-1.66; Model 4) .

Qualitative findings

The brief topic guide that was used focused on sharing experiences or insights related to social media and peer interactions on smoking. Two independent themes (influence of social media on smoking and impact of peer interactions on smoking) emerged from the interviews. The brief topic guide limited the interview to capturing the basic impact of social media and peer interactions on smoking behaviour that was beyond the reach of the structured quantitative measures. Due to time and resource constraints, it was not possible to have formal qualitative evaluations such as in-depth interviews and focus group discussions, which would have allowed an exploration of the different perceptions and thoughts related to factors underlying initiation or continuation of smoking.

A. Influence of social media on smoking

Participants spoke of how specific Facebook groups and short YouTube video clips aided in developing their fascination with smoking. Many participants expressed that the smoking mannerisms of popular male protagonists and even antagonists featured on social media influenced their attitudes towards smoking. One participant stated,

"Some pictures and video clips of a show called 'Narcos' was shared on Facebook. The main and my favourite character was Pablo Escobar. He was a "Godfather" figure and drug dealer who smoked most of the time with a unique style while leading a team of gangsters. I was very fascinated by that scene and imitated it several times."

One participant who mostly watched YouTube everyday said,

"One day I was watching a movie on YouTube called 'Agantuk,' which was directed by Satyajit Ray. The hero was asked about the existence of god, at which point he put some tobacco in his pipe, lit it, then inhaled. I liked this scene very much."

Another participant recounted a story contributing the initiation of their smoking behaviour to social media,

"When I first started using Facebook, I viewed many beautiful pictures of smokers exhaling smoke using different styles like smoke rings, and it was the first time I was attracted to, and started, smoking."

This participant also stated that these first images of smokers were the main influence for him to continue using Facebook, as he wanted to look for more images like these.

Analysis of these quotes, along with others similar to these, reveal how portrayals of tobacco on social media like Facebook and YouTube drew the students in with attractive depictions of smoking, sometimes using a likable main character to show how "cool" smoking is. Another theme that emerged was imitation- students copying the smoking behaviour of characters they connected with on social media. Quotes like these helps to explain how social media can influence smoking behaviour in this age group.

B. Influence of peer interactions on smoking

When asked about the influence of face-to-face peer interactions on smoking behaviour, one participant attributed his initial desire to smoke to a combination of exposure to friends smoking in his proximity and to peer pressure during a difficult time in his life,

"We arranged a picnic together. There were many friends who smoked. I was slightly affected by them. I thought, 'if they can do it, why not me;' and so, I did too. Moreover, there was another issue— I was frustrated at the time with a personal issue and my friends advised that smoking will heal me."

Other participants shared similar statements as this on the topic of peer interactions and smoking. They mentioned that friends insisted they try the "experience" for the first time, provided the first few cigarettes, or suggested that they take up smoking during a vulnerable period, such as during a breakup, after failing an exam, or during a financial crisis. Analysis of this portion of the interview revealed a theme of friends and peers being involved with the participants' first instance of tobacco use, suggesting that face-to-face peer interactions can also greatly influence smoking behaviour in students.

Discussion

This study suggests that social media and peer group involvement are associated with tobacco smoking among university students in an urban setting of Dhaka, Bangladesh. This finding is consistent with the literature that peer group interaction and social media play a key role in determining smoking behaviour (21). Tobacco smoking is widely practiced in Bangladesh, especially among adults. Adolescents and young adults are the most vulnerable groups for tobacco smoking (22–24). The overall prevalence estimate of

tobacco smoking among university students in the urban Dhaka region was 33.5%. A recently published article suggests that the prevalence estimate of this study is slightly lower than the prevalence estimate of 37% among university students in the Sylhet region (10). However, the Global Adult Tobacco Survey (GATS) found that the overall prevalence rate of tobacco smoking in Bangladesh was 18.0%, which suggests there is a higher prevalence of smoking among university students in Dhaka, Bangladesh than among adults in general (9). In this study, 43.7% of the male participants were smokers, which is also higher than the adult male prevalence reported in the GATS study (9). Similarly, the smoking prevalence among male students of this study was higher than prevalence estimates for India (20.4%), Pakistan (26.1%), Nepal (33.6%) and Malaysia (41.2%), but lower than another study conducted in Bangladesh (68.0%)(25-29). This suggests that smoking prevalence among male students in Bangladesh may be among the highest in South-East Asian Countries.

The role of social media as an influence on attitudes towards tobacco use among Bangladeshi university students has been largely overlooked till date, and no study was found that researched this association in Bangladeshi youth. The current study investigated this relationship for the first time and found a strong association between social media use and students tobacco consumption. However, echoing a previous study, our study found that Facebook use had lower odds on students' smoking behaviour (30). Although Facebook use lowered the students' odds of smoking, use of YouTube was associated with higher odds of smoking. Studies that have performed content analyses on social media, especially YouTube and Facebook, have found that tobacco related materials are not only ample, but also dominantly positive in its portrayal of tobacco use (31–39). One of the potential reasons behind this overabundance of tobacco related content in social media is that after legislative bans on tobacco advertising, promotion, and sponsorship came into effect, the tobacco industries pushed to use social media as a tool to keep their products in the minds of current and potential tobacco consumers (21,40). This tobacco content on social media has a great negative impact on the behaviour of youth and young adults (41,42). Consistent with previous studies, this study also suggests that use of social media, including sharing and liking tobacco related content, is associated with smoking (32,43,44). This study also suggests that long-term engagement with social media is

associated with smoking, as participants who have been using social media for five years or more had almost two times the odds of being smokers than those who have been using social media for less than five years. In addition, our study suggests that students who use social media typically during the night-time had more than two times the odds of smoking than that of students who used social media typically during the daytime.

Peer involvement was also found to be strongly associated with smoking in this study. Results suggest that students who spent more than four hours per day with friends had almost two times the odds of smoking than those who spent less than 2 hours per day with friends. This finding supports the theory that unstructured peer socialization has a delinquency-facilitating effect on behaviour (45). Furthermore, our study suggests that peer socialization at night was more associated with tobacco smoking than socialization during the daytime; students who spent their time with peers more often at night had more than two-times the odds of being a smoker than those who spent the daytime more often with their peers.

Conclusion

This study suggests a high prevalence of smoking tobacco among university students in Dhaka, Bangladesh, which is emerging as a major public health concern in the country. Findings also suggest the initiation and continuation of smoking may be influenced by peers and social media, which are novel findings for this context. Future large-scale research should continue to investigate the roles social media and peer interaction has on smoking, as well as intervention methods to decrease smoking among this population. For example, social media may also be harnessed to encourage smoking cessation. Smoking cessation counselling, awareness programs, and warnings about the health hazards of smoking might also be disseminated and shared through social media. Nonetheless, decreasing both the proliferation of tobacco content on social media and the negative effects tobacco content has on university students should be a topic of discussion among health policy makers and officials regulating government censorship.

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Authors Contribution

NUR conceptualised the study, drafted the protocol, developed tools, trained the RAs, conducted qualitative interviews, prepared the report and manuscript. MTH edited the protocol, tools, drafted the topic guide, trained RAs, drafted the manuscript. NUR and MTH equally contributed to this manuscript. SH prepared the tables, reviewed the results; EC critically reviewed the manuscript and edited. KA, ABC, and SH reviewed the tools, provided input for reporting and analysis. FA contributed to the protocol, overall supervision of research activities and critically reviewed the manuscript.

Conflicts of Interest

The authors declare no competing interests

Data Sharing

Data will be shared upon reasonable request. No patient was involved during data collection

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Tables:

Table 1: Sociodemographic characteristics of participants, by smoking status

Variables	**Total (n) (% within column)**	**Smoker (% within row)**	**Non-smoker (% within row)**	**χ^2 value**
	600 (100%)	**201 (33.5%)**	**399, (66.5%)**	
Gender				
Male	451 (75.2)	197 (43.7)	254 (56.3)	84.5***
Female	149 (24.8)	4 (2.7)	145 (97.3)	
Age group				
18-21	306 (51.0)	94 (30.7)	212 (69.3)	2.2
22-24	233 (38.8)	84 (36.1)	149 (63.9)	
25-32	61 (10.2)	23 (37.7)	38 (62.3)	
Mean age	21.8 (± 2.2)	22.09 (± 2.13)	21.64 (± 2.21)	
Living place				
With family	250 (41.7)	76 (30.4)	174 (69.6)	1.9
Hall/hostel	239 (39.8)	86 (36.0)	153 (64.0)	
Mess/sublet	111 (18.5)	39 (35.1)	72 (64.9)	
Father's educational qualification				
Non-formal education	22 (3.7)	11 (50.0)	11 (50.0)	18.4**[a]
Primary (1-5)	35 (5.8)	16 (45.7)	19 (54.3)	
Secondary	74 (12.3)	29 (39.2)	45 (60.8)	
Higher secondary	99 (16.5)	30 (30.3)	69 (69.7)	
Undergraduate	175 (29.2)	52 (29.7)	123 (70.3)	

Postgraduate	190 (31.7)	58 (30.5)	132 (69.5)	
PhD	5 (0.8)	5 (100.0)	0 (0.0)	
Mother's educational qualification				
Non-formal education	22 (3.7)	11 (50.0)	11 (50.0)	7.5
Primary	63 (10.5)	23 (36.5)	40 (63.5)	
Secondary	138 (23.0)	53 (38.4)	85 (61.6)	
Higher secondary	168 (28.0)	53 (31.5)	115 (68.5)	
Undergraduate	122 (20.3)	38 (31.1)	84 (68.9)	
Postgraduate	85 (14.2)	22 (25.9)	63 (74.1)	
PhD	2 (0.3)	1 (50.0)	1 (50.0)	
Family income of the respondent				
<25,000	166 (27.7)	60 (36.1)	106 (63.9)	2.4
25,001-50,000	169 (28.2)	49 (29.0)	120 (71.0)	
50,001-100,000	160 (26.7)	54 (33.8)	106 (66.3)	
>100,000	105 (17.5)	38 (36.2)	67 (63.8)	
Personal income of the respondent				
Yes	187 (31.2)	67 (35.8)	120 (64.2)	0.7
No	413 (68.8)	134 (32.4)	279 (67.6)	

n = 600, **p<0.01; ***p<0.001; [a] Fisher's Exact Test

Table 2: Association of social media use with smoking

Variables	**Total (n) (% within column)**	**Smoker (% within row)**	**Non-smoker (% within row)**	**χ^2 value**

	600 (100%)	**201 (33.5%)**	**399 (66.5%)**	
Preferred social media				
Facebook	438 (73.0)	132 (30.1)	306 (69.9)	9.105*
YouTube	131 (21.8)	58 (44.3)	73 (55.7)	
Other media	31 (5.2)	11 (35.5)	20 (64.5)	
Duration of social media use				
≤ 5 years	137 (22.8)	31 (22.6)	106 (77.4)	9.420**
> 5 years	463 (77.2)	170 (36.7)	293 (63.3)	
Typical time of day for social media use				
Daytime	67 (11.2)	13 (19.4)	54 (80.6)	6.728**
Night-time	533 (88.8)	188 (35.3)	345 (64.7)	
Liked/followed TAPS related picture/image on social media				
Yes	231 (38.5)	122 (52.8)	109 (47.2)	62.894***
No	369 (61.5)	79 (21.4)	290 (78.6)	
Shared TAPS related picture/image on social media				
Yes	201 (33.5)	148 (73.6)	53 (26.4)	218.517***
No	399 (66.5)	53 (13.3)	346 (86.7)	
Liked/followed TAPS related video on social media				
Yes	237 (39.5)	131 (55.3)	106 (44.7)	83.371***
No	363 (60.5)	70 (19.3)	293 (80.7)	
Shared TAPS related video on social media				
Yes	205 (34.2)	153 (74.6)	52 (25.4)	236.508***
No	395 (65.8)	48 (12.2)	347 (87.8)	
Followed/joined any groups related to smoking in social media				
Yes	32 (5.3)	19 (59.4)	13 (40.6)	10.159**

No	568 (94.7)	182 (32.0)	386 (68.0)	

n = 600, *p<0.05; **p<0.01; ***p<0.001; TAPS = tobacco advertising, promotion and sponsorship

Table 3: Association of Peer Interaction with Smoking

Variables	**Total (n) (% within column)**	**Smoker (% within column)**	**Non-smoker (% within column)**	**χ^2 value**
	600 (100%)	**201 (33.5%)**	**399 (66.5%)**	
Hours spent with peers				
≤ 2 hours/day	155 (25.8)	44 (21.9)	111 (27.8)	12.373**
> 2 hours/day	203 (33.8)	56 (27.9)	147 (36.8)	
≥ 4 hours/day	242 (40.3)	101 (50.2)	141 (35.3)	
Typical time of day spent with peers				
Daytime	348 (58.6)	84 (42.0)	264 (67.0)	34.187***
Night-time	246 (41.4)	116 (58.0)	130 (33.0)	
Missing	6 (1.0)	1 (0.5%)	5 (1.0)	
Peer pressure for smoking				
Yes	236 (39.3)	86 (42.8)	150 (37.6)	1.510
No	364 (60.7)	115 (57.2)	249 (62.4)	
Peer inspiration for smoking				
Yes	197 (32.8)	73 (36.3)	124 (31.1)	1.665
No	403 (67.2)	128 (63.7)	275 (68.9)	
Does peer pressure influence smoking?				
Yes	433 (72.2)	137 (68.2)	296 (74.2)	2.417
No	167 (27.8)	64 (31.8)	103 (25.8)	

n = 600, **p<0.01; ***p<0.001

Table 4: Multivariate logistic regression analysis of the study variables

Variables	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sociodemographic characteristics				
Age group				
18-21	1.00	1.00	1.00	1.00
22-24	1.27 (0.89–1.83)	1.15 (0.78–1.72)	1.32 (0.81–2.18)	1.26 (0.86–1.85)
25-32	1.37 (0.77–2.42)	1.28 (0.68–2.41)	2.00 (0.91–4.39)	1.08 (0.59–1.99)
Gender				
Female	1.00	1.00	1.00	1.00
Male	**28.12 (10.23–77.25)**	**29.16 (10.55–80.69)**	**51.83 (15.26–176.06)**	**23.50 (8.47–65.21)**
Living place				
With family	1.00	1.00	1.00	1.00
Hall/hostel	1.29 (0.88–1.88)	1.17 (0.78–1.78)	1.63 (0.96–2.78)	1.08 (0.72–1.63)
Mess/sublet	1.24 (0.77–1.99)	0.76 (0.46–1.26)	1.52 (0.80–2.86)	1.25 (0.76–2.06)
Personal income of the respondent				
Yes	1.00	1.00	1.00	1.00
No	0.86 (0.60–1.24)	1.11 (0.74–1.67)	1.00 (0.61–1.63)	0.98 (0.66–1.45)

Social Media Use				
Preferred social media: Facebook				
No	1.00	1.00	1.00	1.00
Yes	**0.58 (0.40–0.84)**	**0.54 (0.36–0.82)**	0.97 (0.35–2.72)	**0.56 (0.38–0.83)**
Preferred social media: YouTube				
No	1.00	1.00	1.00	1.00
Yes	**1.81 (1.22–2.69)**	**1.77 (1.15–2.75)**	2.12 (0.71–6.37)	**1.86 (1.22–2.83)**
Duration of social media use				
≤ 5 years	1.00	1.00	1.00	1.00
> 5 years	**1.98 (1.27–3.09)**	1.25 (0.76–2.07)	**2.03 (1.12–3.69)**	**1.65 (1.04–2.62)**
Typical time of day for social media use				
Day-time	1.00	1.00	1.00	1.00
Night-time	**2.26 (1.20–4.25)**	**2.41 (1.24–4.69)**	2.36 (0.97–5.71)	**1.95 (1.02–3.73)**
Liked/followed TAPS related picture/image on social media				
No	1.00	1.00	1.00	1.00
Yes	**4.11 (2.87–5.88)**	**3.68 (2.50–5.42)**	0.99 (0.51–1.92)	**3.86 (2.65–5.62)**
Shared TAPS related picture/image on social media				
No	1.00	1.00	1.00	1.00
Yes	**18.23 (11.90–27.93)**	**21.99 (13.35–36.21)**	**4.95 (2.29–10.71)**	**16.90 (10.87–26.29)**

Liked/followed TAPS related video on social media				
No	1.00	1.00	1.00	1.00
Yes	**5.17 (3.59–7.46)**	**5.41 (3.62–8.09)**	0.59 (0.28–1.23)	**4.85 (3.32–7.11)**
Shared TAPS related video on social media				
No	1.00	1.00	1.00	1.00
Yes	**21.27 (13.75–32.89)**	**23.94 (14.52–39.48)**	**9.47 (4.21–21.31)**	**20.50 (13.02–32.26)**
Followed/joined any groups related to smoking in social media				
No	1.00	1.00	1.00	1.00
Yes	**3.10 (1.50–6.41)**	**2.79 (1.26–6.17)**	**3.30 (1.25–8.72)**	**2.88 (1.36–6.11)**
Peer Involvement				
Hours spent with peers				
≤ 2 hours/day	1.00	1.00	1.00	1.00
> 2 hours/day	0.96 (0.60–1.53)	0.89 (0.54–1.48)	1.12 (0.59–2.12)	0.88 (0.54–1.43)
≥ 4 hours/day	**1.81 (1.17–2.79)**	**1.75 (1.09–2.82)**	1.75 (0.96–3.17)	**1.75 (1.12–2.75)**
Typical time of day spent with peers				
Day-time	1.00	1.00	1.00	1.00
Night-time	**2.80 (1.98–3.98)**	**2.11 (1.45–3.08)**	**2.40 (1.50–3.84)**	**2.80 (1.95–4.00)**
Peer pressure for smoking				
No	1.00	1.00	1.00	1.00

Yes	1.24 (0.88–1.75)	1.01 (0.70–1.47)	1.16 (0.73–1.85)	1.14 (0.78–1.66)
Peer inspiration for smoking				
No	1.00	1.00	1.00	1.00
Yes	1.27 (0.89–1.81)	0.90 (0.61–1.32)	0.96 (0.60–1.56)	1.16 (0.79–1.70)
Does peer pressure influence smoking?				
No	1.00	1.00	1.00	1.00
Yes	0.75 (0.51–1.08)	0.72 (0.47–1.08)	0.77 (0.46–1.28)	0.71 (0.48–1.06)

CI: confidence interval; OR: odds ratio

Boldface indicates a significance of p<0.5

[a] Model 1 is unadjusted.

[b] Model 2 is adjusted for age, sex, living place, and income status.

[c] Model 3 is adjusted for all variables related to social media use.

[d] Model 4 is adjusted for all variables related to peer interactions.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6-7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8
Bias	9	Describe any efforts to address potential sources of bias	*8-9*
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	9
		(*c*) Explain how missing data were addressed	9
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	9
		(*e*) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage each stage of study	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-14
		(*b*) Report category boundaries when continuous variables were categorized	10-14
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	10-14
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-14
Discussion			
Key results	18	Summarise key results with reference to study objectives	15-16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15-16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-16
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.